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A new genus and species of marine fish leech (Annelida: Hirudinea: Piscicolidae) from South Africa

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ABSTRACT

The marine fish leech *Lizabdella africana* gen. et sp. n. from the coastal waters of South Africa is described and illustrated. A remarkable feature of the reproductive system is the paired male gonopore; this separates the new genus from all known fish leeches. The specimens were collected on mullets of the genera *Liza* and *Mugil* (Mugiliformes, Mugilidae).

KEY WORDS: Hirudinea, Piscicolidae, fish leeches, *Lizabdella*, Mugilidae, *Liza*, *Mugil*, mullets, Kowie, Swartkops estuary, South Africa, new taxa, identification key.

INTRODUCTION

The marine fish leech fauna is very diverse and new species of these animals are found every year. There are, however, some regions in which fish leeches are still poorly explored—only two species of piscicolid leeches from the coastal waters of South Africa have been described so far. *Malmiana stellata* (Moore, 1958) (= *Ottoniobdella*), one of nine species in the genus *Malmiana*, was collected on a toby fish (Tetraodontidae, unknown species) at Richards Bay, KwaZulu-Natal (Moore 1958). The other eight species of *Malmiana* are known from the North Atlantic (4 species), Gulf of Mexico (1 species), Pacific coast of North America (2 species), and northern California coast (1 species) (Burreson & Kalman 2006). The other South African fish leech species, *Austrobdella oosthuizeni* A. Utevsky, 2004, was collected on *Jasus lalandii* (Crustacea, Decapoda) at Bloubergstrand. Other species in the genus *Austrobdella* are found in Australia and Antarctica (1 species), Tasmania (1 species), southern California (1 species), and Greenland (1 species) (Utevsky 2004).

MATERIAL AND METHODS

Specimens of the new species described in this paper were found by I. Paperna in 1984–1985 in the Kowie and Swartkops estuaries, Eastern Cape. In total, 127 specimens from eight lots were examined. Six lots were preserved in 70% ethanol and two lots in 10% formalin. Sixty-four specimens (five lots) were collected in the Kowie estuary on the edge of the mouth of three *Liza* species (*L. dumuetelli*, *L. tricuspidens*, and *L. richardsoni*) in 1984. Sixty-three specimens were collected in the Swartkops estuary on *Mugil cephalus* in 1985. Two lots were preserved in 70% ethanol and one lot was preserved in 10% formalin. Four specimens were embedded in paraffin and paraplast; transverse sections were cut at 2 µm (holotype and paratype), 5 µm (2 other specimens) and stained with Mallory's triple stain for examining the digestive, reproductive, and lacunar systems. The holotype and two paratypes of *Lizabdella africana* gen. et sp. n. are deposited in the Natural Museum of the National Academy of Sciences of Ukraine, Kyiv (NM NASU). Four paratypes are in the collection of the Natal Museum, Pietermaritzburg, South Africa (NMSA). Other specimens are in the collection of the Department of Zoology and Animal Ecology of the V.N. Karazin Kharkiv National University, Ukraine (KhNU).

TAXONOMY

Family Piscicolidae Johnston, 1865

Genus **Lizabdella** gen. n.

Etymology: The name derives from the generic name of the fish hosts, *Liza*, and Greek *bdella*, a leech.

Type species: *Lizabdella africana* sp. n.

Diagnosis: Small leeches. Body elongated. One pair of eyes on anterior sucker present. Segmental ocelli and ocelli on posterior sucker absent.

Digestive system: oesophageal diverticula absent; posterior crop caeca not totally fused.

Reproductive system: male bursa absent, there are two male gonopores (separated by a tubercle and not clearly visible externally) and accessory glands; vagina long, conductive tissue present, copulatory area absent.

Lacunar system: weakly developed, communications absent.

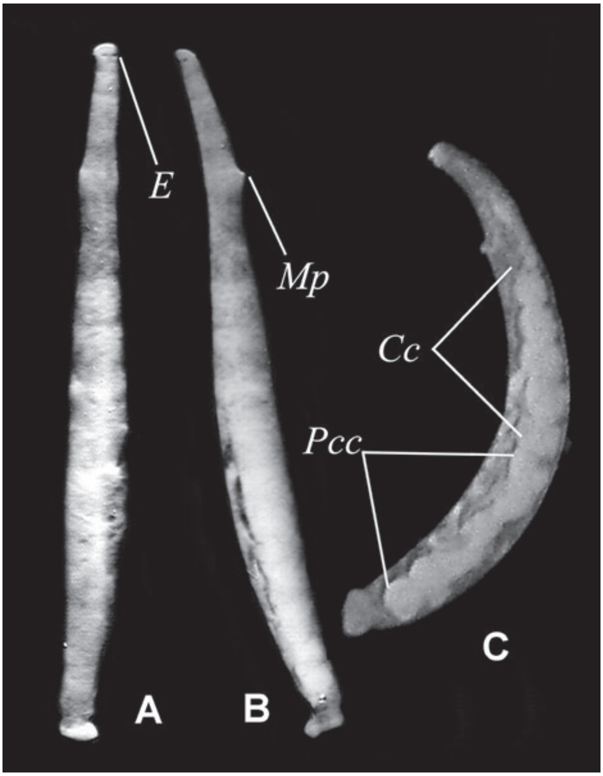

Fig. 1. External view of *Lizabdella africana* gen. et sp. n.: (A, B) holotype, dorsal and lateral views; (C) young transparent specimen, lateral view. Abbreviations: *E* – eyes, *Mp* – male pores, *Cc* – crop chambers, *Pcc* – posterior crop caeca.

Lizabdella africana sp. n.

Figs 1–3

Etymology. The specific name refers to Africa.

Diagnosis: Small leeches. Body cylindrical, tapered toward suckers. Segmental pigmentation present. Suckers small, anterior sucker possessing one pair of eyes. Crop tubular, without chambers. Posterior crop caeca not totally fused. Accessory glands and conductive tissue present. Clitellum with paired male pore. Lacunar system poorly developed.

Description: Small leeches, up to 7.6 mm in length. Measurements of trachelosome: length, 1.7 mm; maximum width, 0.5 mm. Measurements of urosome: length, 5.2 mm; maximum width, 0.7 mm. Body elongated, cylindrical, tapered toward suckers, indistinctly divided into trachelosome and urosome. Body surface smooth with no external pulsatile vesicles. Segmental ocelli absent. There are 6 yellowish brown bands on the trachelosome and 13 segmental bands of the same colour on the urosome. The coloration of suckers is relatively light in comparison with the body. Young specimens may be unpigmented and transparent, the preserved leeches still have numerous black star-shaped cells.

Anterior sucker small, 0.2 mm in diameter (3.5 times smaller than maximum body width), indistinctly separated from trachelosome, eccentrically attached. Surface of sucker smooth, with one pair of eyes at its base, mouth-pore centrally located.

Posterior sucker small, 0.5 mm in diameter (1.5 times smaller than maximum body width and 2.5 times larger than anterior sucker), distinctly separated from urosome, eccentrically attached. Surface of sucker smooth, ocelli absent.

Annulation (Figs 2A, 2C). Preclitellar region of trachelosome consisting of 15 annuli. Clitellum 7-annulate, male pores between annuli 1 and 2, female pore between annuli 5 and 6, copulatory area absent, annuli 1 and 3 subdivided into additional rings. Complete somite 3-annulate. Anus separated by one annulus from posterior sucker.

Digestive system (Fig. 2B). Base of proboscis located at ganglion 2 of ventral nerve cord. Oesophageal diverticula and crop chambers absent. Young specimens with 5 crop chambers (Fig. 1C). Posterior crop chambers not totally fused with 2 fenestrae, extending to posterior-most ganglion of ventral nerve cord. Intestine bearing 2 chambers with lateral processes and rectal dilation.

Reproductive system (Figs 2D–F). Structured testisacs were not found. Only parenchymatous tissue without coelomic epithelium was found in place of testisacs. Seminal reservoirs not developed. Ejaculatory ducts short and loop-like, with rounded terminal portions and accessory glands present. Common atrium and bursa absent. Ejaculatory ducts opening directly on clitellum through two male pores (Fig. 3). Spermatophore consisting of two separate pieces. Ovisacs short and wide, located between ganglia 6 and 7 of ventral nerve cord. Conductive tissue mass without channels connecting vagina and ovisacs. Copulatory area absent.

Lacunar system. Only ventral lacuna developed. Lacunae of testisacs and communications absent. Dorsal lacuna not found. Dorsal and ventral vessels located outside of lacunae.

Comparison: *L. africana* differs from all existing fish leeches in having two separate male pores. It can easily be distinguished from other South African marine leeches.

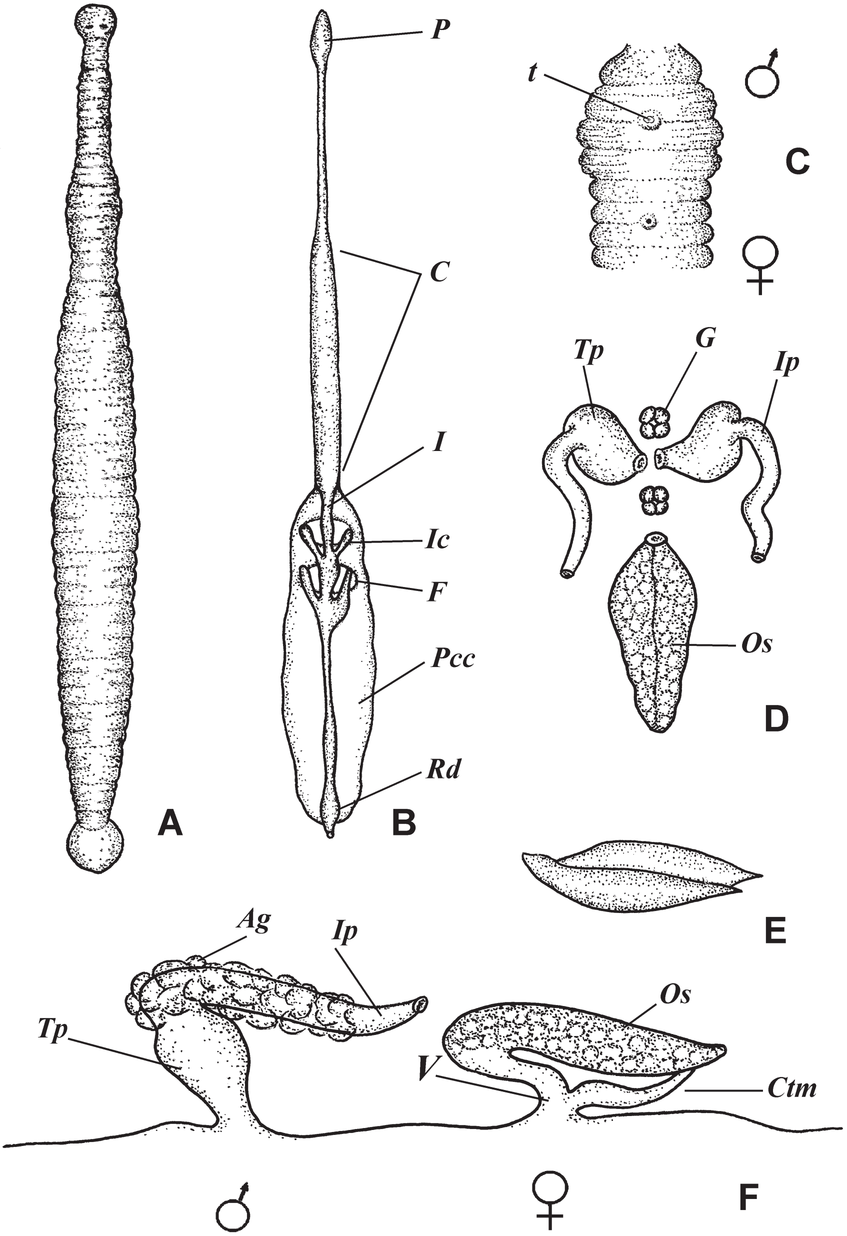

Fig. 2. External and internal characters of *Lizabdella africana* gen. et sp. n., holotype: (A) dorsal view; (B) digestive system, dorsal view (*P* – proboscis, *C* – crop, *I* – intestine, *Ic* – intestinal chambers, *Rd* – rectal dilation, *Pcc* – posterior crop caeca, *F* – fenestrae); (C) clitellum, ventral view, with a tubercle *t* that separates paired male gonopores, which are not clearly visible externally; (D) reproductive system, dorsal view (*G* – ganglia of ventral nerve cord, *Ip* – initial part of ejaculatory duct, *Tp* – terminal part of ejaculatory duct, accessory glands not shown, *Os* – ovisacs, conductive tissue not shown); (E) spermatophore; (F) reproductive system, lateral view (*Ip* – initial part of ejaculatory duct, *Ag* – accessory glands, *Tp* – terminal part of ejaculatory duct, *Os* – ovisacs, *Ctm* – conductive tissue mass, *V* – vagina).

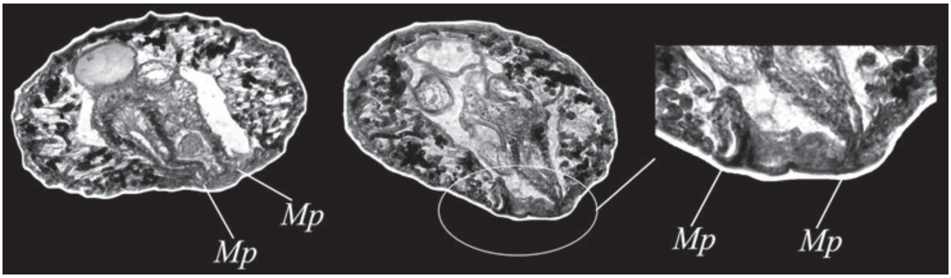

Fig. 3. Male gonopores, transverse section in clitellum region. Abbreviation: *Mp* – male gonopore.

Austrobdella oosthuizeni has a cylindrical trachelosome and a distinctly separated flattened urosome, larger suckers, and no eyes or segmental coloration pattern. In addition, *A. oosthuizeni*, in contrast to *L. africana*, possesses larger crop chambers and totally fused posterior crop caeca, a long bursa and a long vagina with no conductive tissue. The new species also differs from *Malmiana stellata*, which is characterised by the absence of integrated eyes and a segmental coloration pattern. It is not possible to compare the new species with *M. stellata* in detail, as internal characters of the latter are still unknown.

Holotype: AN 42 (on 4 slides). SOUTH AFRICA: *Eastern Cape*: Kowie estuary [33°36'S:26°54'E], from *Liza* sp., 21.x.1984, I. Paperna (NM NASU).

Paratypes: Six specimens with the same label data: AN 43 (on 4 slides) and AN 44 (NM NASU), four other specimens in NMSA.

Other material examined: SOUTH AFRICA: *Eastern Cape*: 64 specimens, same data as holotype; 63 specimens, Port Elizabeth, Swartkops estuary [33°52'S:25°36'E], 1985, I. Paperna (KhNU).

Key to marine fish leeches from South African waters

1 Body slender fusiform, slightly expanded in middle, trachelosome and urosome cylindrical 2

– Body distinctly divided into trachelosome and urosome with 'shoulders', trachelosome subcylindrical, urosome flattened......**Austrobdella oosthuizeni** A. Utevsky

2 One pair of eyes on anterior sucker, segmental pigmentation present .... **Lizabdella africana** gen. et sp. n.

– Eyes on sucker and segmental pigmentation absent .... **Malmiana stellata** (Moore)

DISCUSSION

The absence of pulsatile vesicles and the simple structure of the lacunar system of *L. africana* allows assignment of this species to the Platybdellinae. The lacunar system of the new species is very similar to that of the type species of the subfamily, *Platybdella anarrhichae* (Diesing, 1859). It should, however, be noted that recent phylogenetic studies suggest that the subfamily Platybdellinae is not a monophyletic group (Williams & Burreson 2006; Utevsky *et al.* 2007). Only 'classic' platybdellines occurring in Arctic and Boreal waters formed a monophyletic group (Utevsky & Trontelj 2004). The question of whether *L. africana* should be assigned to this group remains open because of the need for a phylogenetic analysis based on molecular data. Interestingly, the paired male pore of *L. africana*, a distinguishing feature of the species, seems to represent a reversal to the primitive state found in most clitellates with the exception of such advanced groups as leeches and the leech-like branchiobdellidans and acanthobdellidans that have non-paired gonopores. The lack of testisacs is also characteristic of *Trachelobdella oregonensis* Burreson, 1976. In this species, only newly hatched individuals possess testisacs and function as males, whereas bigger leeches have well-developed ovisacs and lack testisacs (Burreson 1976). Perhaps the same relationships can be found in *L. africana*, although its hatchlings were not at our disposal.

Most fish leeches are characterised by a high host-specificity; there are very few Southern Hemisphere fish leeches with a broad range of hosts. *L. africana* was found in a previously unexplored region on new fish hosts of the genera *Liza* and *Mugil* (Mugiliformes, Mugilidae). It is believed that these leeches are specific parasites of mugilid fishes.

The faunas of fish leeches of the Northern Hemisphere and the Antarctic Seas are relatively rich (Utevsky 2005). Although very few species have been described from the subtropical and temperate waters of the Southern Hemisphere, the piscicolid fauna of this part of the world is most likely much more diverse than considered before. This would be in complete agreement with Sawyer's (1986) hypothesis on the temperature/salinity proportion as a limiting factor for fish leech distribution. Sawyer's hypothesis is corroborated by the richness of the piscicolid fauna in the Boreal waters. Conversely, subtropics of the Southern Hemisphere and Notal waters can provide favourable environments for the diversity of piscicolids and new taxonomic surveys should be able to recover additional species.

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